

# (12) UK Patent Application (19) GB (11) 2 197 786 (13) A

(43) Application published 2 Jun 1988

(21) Application No 8627829

(22) Date of filing 21 Nov 1986

(30) Priority data

(31) 8528755  
8607306

(32) 22 Nov 1985  
25 Mar 1986

(33) GB

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(51) INT CL<sup>4</sup>

A47K 3/20

(52) Domestic classification (Edition J):

A4N 2B 2D1 7 8X  
B1C 121 2012 PJA

(56) Documents cited

GB A 2166650  
GB 1029160

GB A 2153219  
US 3964108

GB 1120042

(58) Field of search

A4N  
Selected US specifications from IPC sub-class  
A47K

## (54) Bath/shower mixer

(57) A bath/shower mixer includes a chamber (51) into which water flows in use of the mixer, and a collapsible bag (52) containing liquid soap is located within the chamber to allow the soap to be pressurised to the same pressure as the water in the chamber. The water also flows through a venturi (56), and a connection (65, 66, 67, 68, 63) is made between the soap bag (52) and the venturi (56) to enable liquid soap to be sucked into the water flowing through the venturi. A valve (62) in the soap supply line enables the concentration of the soap in the outflowing water to be controlled, or to be reduced to zero to provide a clear water outflow. A gate valve (58) enables the selection of a bath outlet (72), or a shower outlet (60) for the outflowing water.

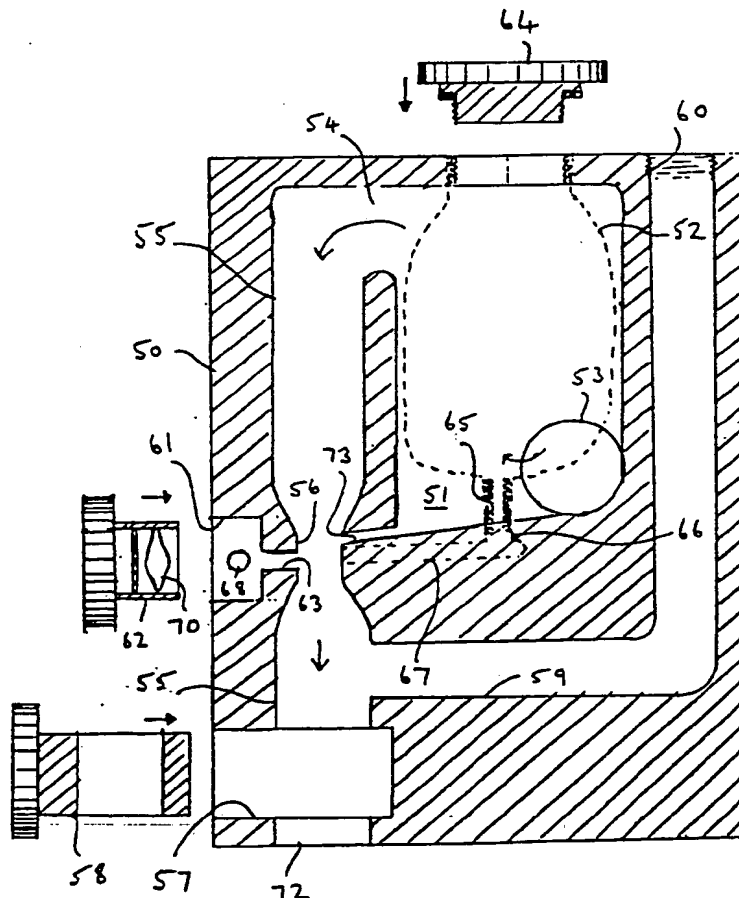


Fig 3

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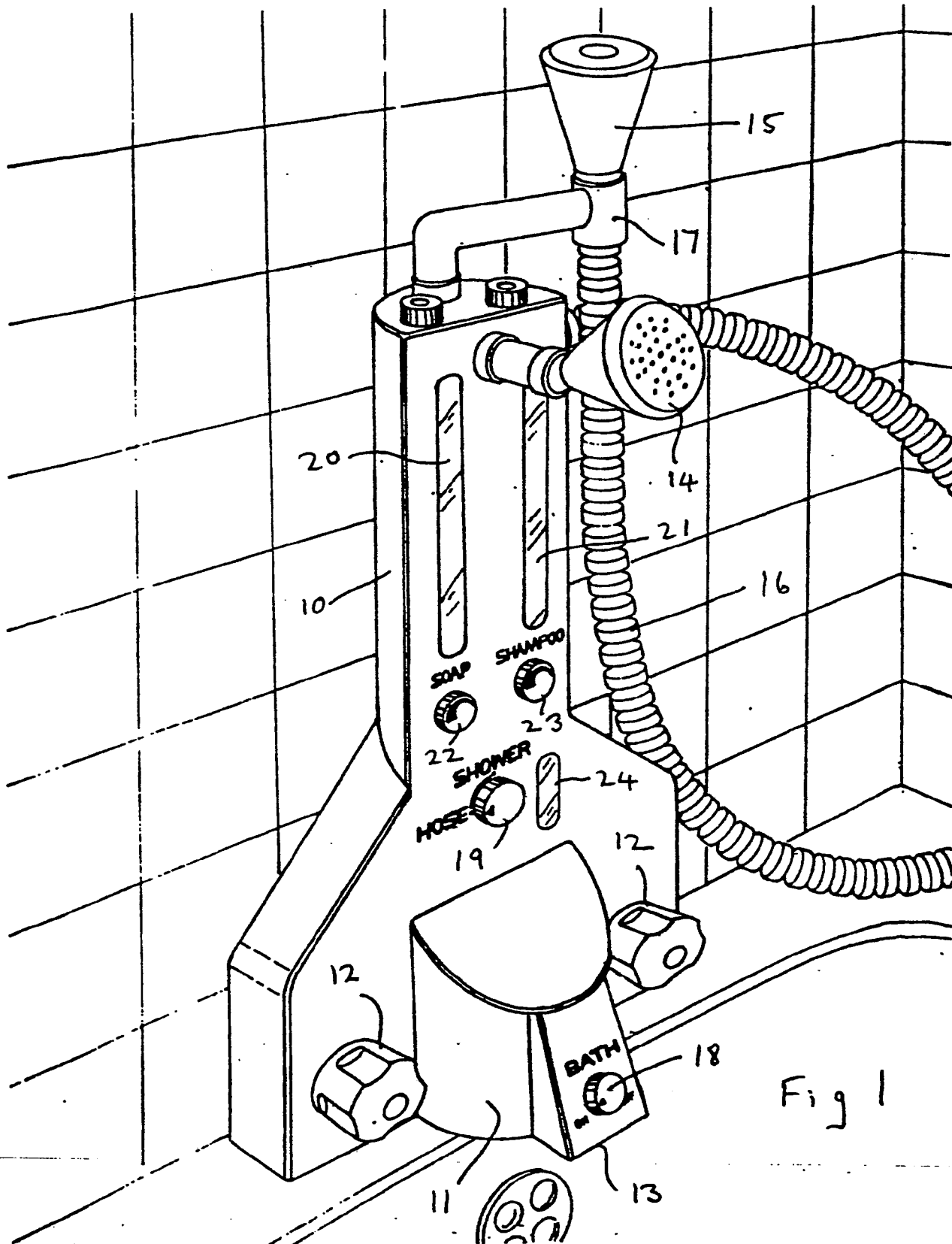


Fig 1

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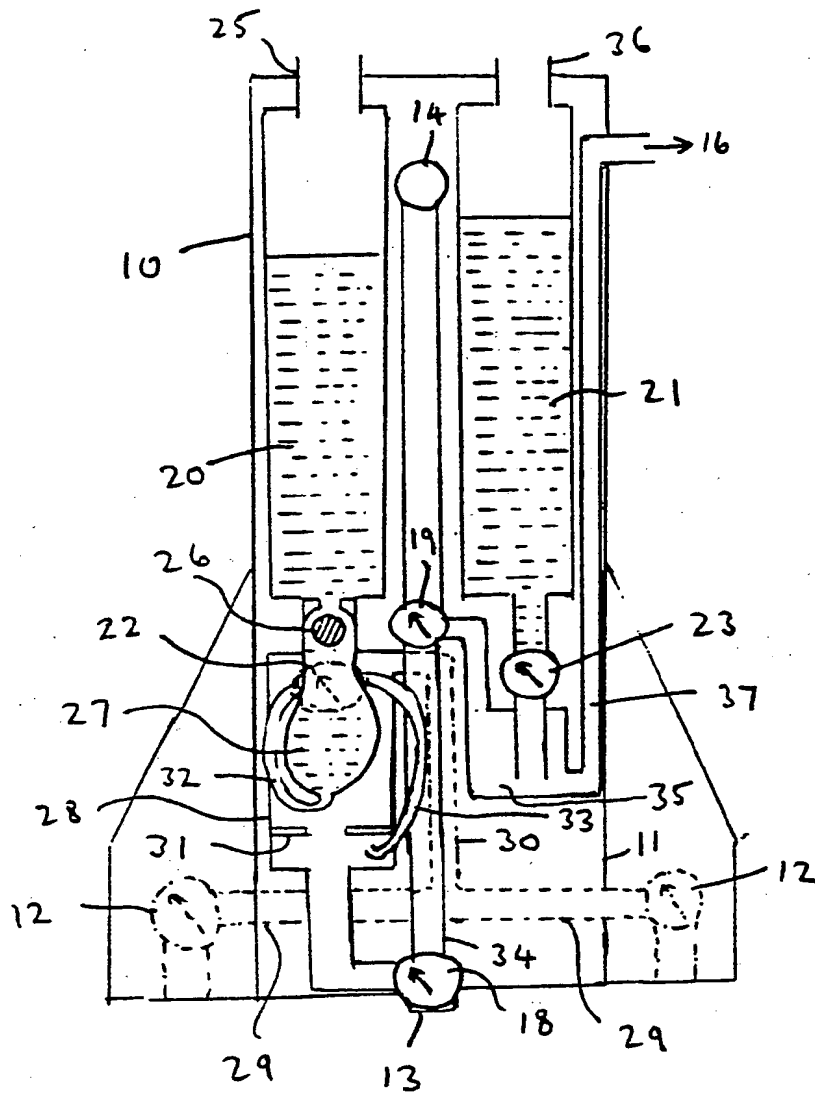


Fig 2

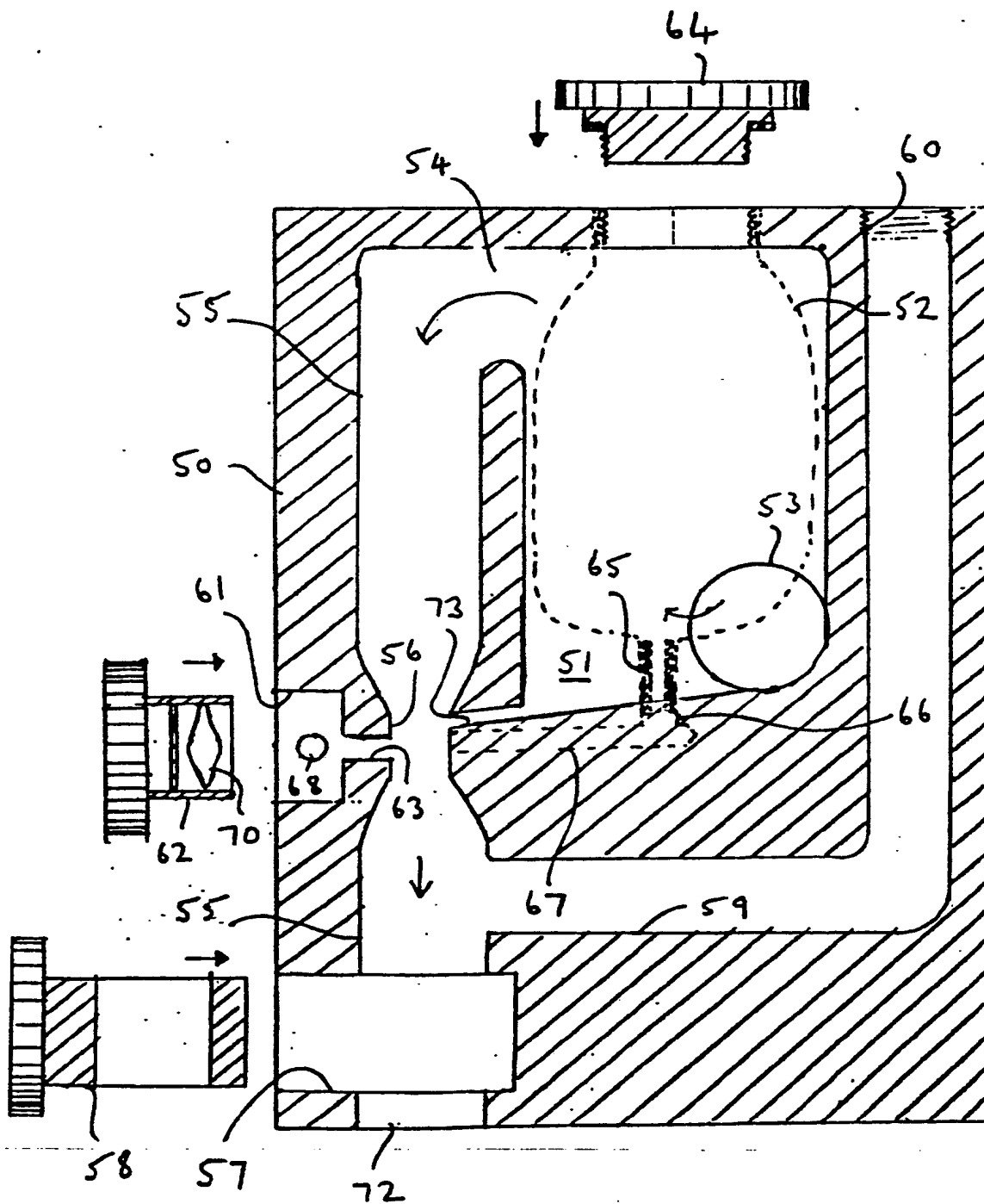


Fig 3

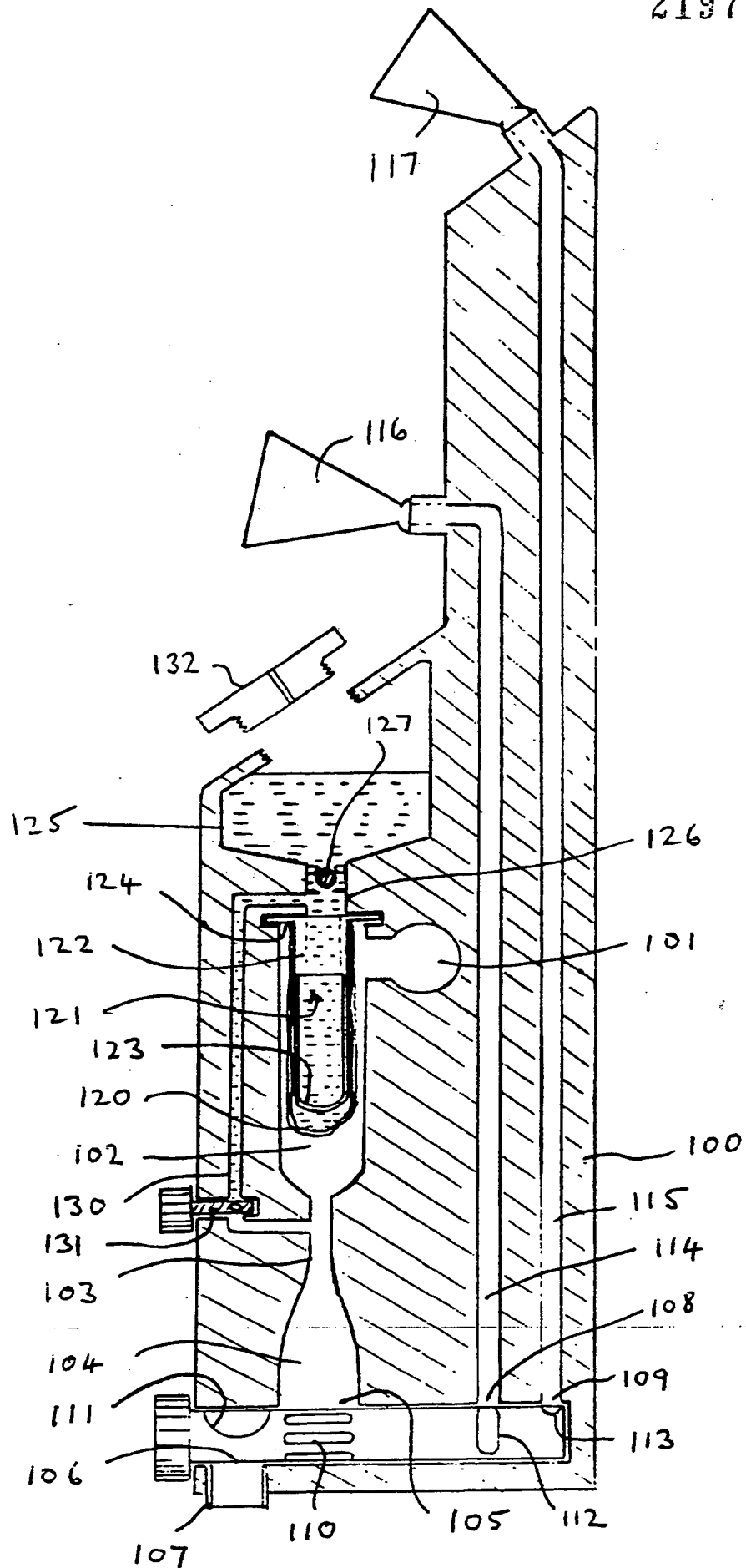


Fig. 4

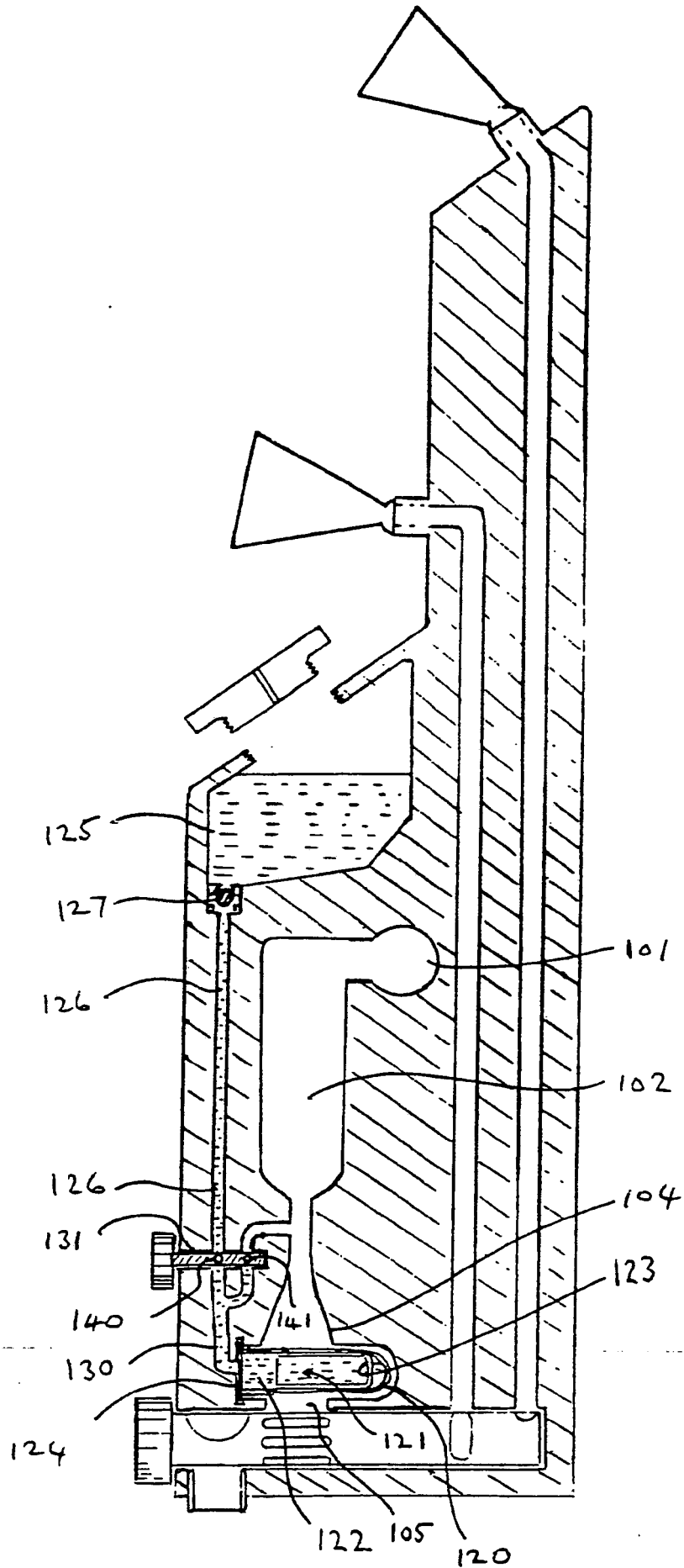


Fig 5

BATH / SHOWER MIXER

This invention relates to a bath/shower mixer, that is a mixing device for attachment to a bath to provide outlets of mixed hot and cold water to either the bath or a shower head.

Various forms of such mixers are known, including a mixer in which solid soap is dissolved in the water, as described in my UK Patent Specification No. 1,403,874.

It is an object of the present invention to provide improved bath/shower mixers utilising liquid additives such as soap or shampoo.

According to one aspect of the invention there is provided a bath/shower mixer comprising a chamber into which water flows in use of the mixer, a reservoir for a liquid additive, means for transmitting the pressure of the water in the chamber to the additive in the reservoir, means for producing in the flowing water a region of reduced pressure compared with the pressure of the water in the chamber, and means for selectively connecting the reservoir to the region of reduced pressure whereby the additive may be introduced into the flowing water, and diverter means for diverting the flowing water either to a bath outlet or to a shower outlet of the apparatus.

According to another aspect of the invention, there is provided a shower apparatus comprising a body portion adapted to be secured to a bath, first and second shower heads mounted on said body portion, and selector means for diverting water to said shower heads.

Various embodiments of bath/shower mixers in accordance with the invention will now be described, by way of example, with reference to the accompanying drawings, in which:-

Figure 1 is a perspective view of a first embodiment of a mixer secured to a bath in place of the bath taps;

Figure 2 is a vertical cross-section (front view) of the mixer of Figure 1;

Figure 3 is a vertical cross-section (side view) of a second embodiment of the invention;

Figure 4 is a vertical cross-section (side view) of a third embodiment of the invention; and

Figure 5 is a vertical cross-section (side view) of a fourth embodiment of the invention.

Referring first to Figure 1, the external features of a first embodiment of the mixer will be described. The casing of the mixer has a half-cylindrical upper portion 10 and a generally cylindrical lower portion 11. The mixer is secured to the bath by means of valves 12 which are attached to the hot and cold water supply pipes in place of existing bath taps. Hot and cold water are mixed within the mixer, and the mixed water may be caused to flow out into the bath via spout 13, or into either one of two shower heads, a fixed, tiltable, shower head 14

and a shampoo head 15 secured to the end of a flexible hose 16. As shown in Figure 1, the head 15 of the shampoo hose is stowed when not in use, in a holder 17 extending from the top of the upper casing 10.

Instead of the shower heads being as shown, two fixed heads may be used, or two heads secured to the ends of flexible pipes. Alternatively, the heads may be interchanged. By using common connectors, interchangeable heads may be supplied so that the user can choose the desired configuration.

A lower control knob 18 on the spout 13 enables a selection to be made between the bath and one of the showers, an upper control knob 19 enabling the desired shower head to be selected. Thus, clear water at the desired temperature may be obtained as required from any one of the three outlets. By means of a suitable valve, it is possible to control the shower head selection so that either one of the shower heads is used, or so that both can be used together. The water outflow from any one of the outlets may be made to carry a liquid additive, as will now be briefly explained. The upper casing 10 contains a reservoir 20 for liquid soap, and a reservoir 21 for shampoo. Liquid soap may be introduced at the desired rate into the water flowing out of whichever of the outlets of the mixer is selected, the rate of flow being determined by a soap control knob 22. By means of a shampoo control knob 23, a preselected quantity of shampoo may be caused to flow to shampoo hose. By turning the shampoo control knob 23, shampoo is allowed to flow from the shampoo reservoir 21 into a holding reservoir 24, until the holding reservoir contains the desired amount, as viewed by a transparent window in front of the holding reservoir 24. Then, on selection of the shampoo hose by knob 19, the quantity of shampoo in the holding reservoir 24 is propelled, substantially undiluted, up to the head 15 of the shampoo hose to provide a suitable amount of shampoo to produce a lather. The bather can then, as he usually does, temporarily avoid the shower while washing his hair, and will then have clean water available for rinsing without taking any further action.

The way the mixer operates will now be described with reference to Figure 2. The soap reservoir 20 consists of a tubular chamber within the upper casing 10, fillable through a neck 25 which extends through the top of the casing 10. The level of liquid soap in the reservoir may be observed through a transparent window in the front wall of the upper casing 10. Whenever the mixer is inoperative, liquid soap flows out of the bottom of the reservoir 20, past a ball valve 26, and into a collapsible bag 27. The bag 27 is contained within a chamber 28, through which chamber flows all water passing through the mixer. Mixed hot and cold water, from inlet pipes 29, flows into the top of chamber 28 via feed pipe 30. By virtue of the flexibility of the collapsible bag 27, liquid soap inside it is maintained at the same pressure as the flowing water. At the lower end of chamber 28, a narrowing region is provided, either by way of tapering walls of the chamber, or by equivalent means such as an apertured plate 31 as shown. This produces a venturi effect, with a lowering of pressure just below the narrowed region



This lowering of pressure is used to suck liquid soap from the collapsible bag into the flowing water within the chamber 28. A flexible pipe 32 takes the liquid soap from the bottom of the bag 27 to a valve (not shown in Figure 2) operated by the knob 22. The valve is such as to control the rate of flow of liquid soap along a pipe 33 which extends from the valve to the lower pressure region below the narrowed portion of chamber 28. Water containing the desired concentration of liquid soap (or no soap if the valve is turned to the off position) is then diverted either to the bath via spout 13 or up an outlet pipe 34 to one of the shower heads. A simple on/off gate valve (not shown) is used to select "bath" or "shower"; if the gate valve is opened, water flows to the bath, whereas if the gate valve is closed, water flows up the outlet pipe 34. As mentioned above, a diverter valve (not shown) operated by knob 19 diverts water either vertically upwards to the fixed head 14, or sideways into the shampoo hose system.

The shampoo hose system includes the shampoo reservoir 21 and a holding reservoir 35. The shampoo reservoir 21 may be filled through a neck 36 which extends through the top of the casing 10. Rotation of the control knob 23 operates a valve which allows shampoo to flow from the reservoir 21 to the holding reservoir 35. A transparent window in the front wall of the upper casing 10 enables the desired amount of shampoo to be loaded into the holding reservoir, after which the valve is closed. A supply pipe 37 for the shampoo hose is connected to the bottom of the holding reservoir 35, while water directed into the shampoo hose system enters the top of the holding reservoir 35 along a pipe 38. On operating the diverter (by using knob 19) so as to select the shampoo hose, water flows into the top of the dispensing container 35 and pushes the charge of shampoo before it. In this way, a substantially undiluted charge of shampoo is propelled along the shampoo hose, followed shortly by clear water as the remaining traces of shampoo are washed out of the holding reservoir 35. In order to obtain a further charge of shampoo, the water supply to the shampoo hose is briefly switched off, and the above steps repeated.

An alternative form of mixer will now be described with reference to Figure 3, which is a cross-sectional side view of a mixer using two collapsible bag reservoirs. The view shown in Figure 3 represents one half of the mixer, which may be formed in solid material (e.g. by casting or moulding) for securing to a corresponding, oppositely-handed, half. The body 50 of the mixer, which may typically be of a plastics material, may be rectangular or other suitable shape in plan view, for example each body half may be half-cylindrical. Most of the channels formed in the body half are of half-cylindrical shape, so that when two body halves are secured together, generally cylindrical passageways are formed. A large pressure chamber 51, however, is of generally rectangular cross-section, as viewed from above, so that the chamber 51 of each body half can contain a collapsible bag 52. Water enters the pressure chamber 51 through an aperture 53 in the wall of the chamber remote from the face on which the section is taken. The aperture 53 in one body half is connected to a cold water supply while the corresponding

aperture of the other body half is connected to the hot water supply. The two chambers 51 form a joint chamber in which hot and cold water mix, and apply pressure to the collapsible bags 52, one in each half.

Water flows out of the top of pressure chamber 51, along a short horizontal channel 54 and down a venturi tube 55. A throat portion 56 is provided just below the level of the bottom of chamber 51, after which the tube 55 widens again before entering a gate valve chamber 57. A gate valve 58 opens or closes the lower part of venturi tube 55, allowing water to flow out of aperture 72 in the bottom of the mixer when the gate valve is open. When the gate valve is closed, water flows along a shower supply channel 59 which extends horizontally away from the lowermost part of the venturi tube 55, and then goes vertically upwards to a suitable outlet 60 for a shower hose.

The passageways so far described can be moulded into the solid material, as can the cavity 61 which forms a housing for a valve 62. The cavity 61 is connected by a passageway 63 to the venturi throat 56. Other passageways and openings may be formed by drilling into the solid material.

The collapsible bag 52 is secured to a top wall 63, and a stopper 64, which is screwed into a thread formed in the top wall 63, may be removed to allow liquid soap or shampoo to be poured into the collapsible bag 52, and replaced to seal the bag. The bottom of the bag 52 has an outlet tube 65 which is sealed into a short vertical passageway 66 in the solid material below the chamber 51. Both the aperture in the top wall 63 and the vertical passageway 66 may be drilled from the top of the mixer. The short vertical passageway 66 communicates with a horizontal passageway 67, which may be drilled from the left-hand side of the mixer as viewed in Figure 3. The horizontal passageway 67 extends to a position behind the cavity 61, with which it is connected by a horizontal passageway 68 which emerges into the rear cylindrical face of the cavity 61. After drilling of the passageway 67, its mouth may be plugged so that the only exit for a liquid in the bag 52 is through passageway 68 into cavity 61.

The valve 62 is a hollow cylindrical member which forms a seal within the cavity 61. A tapering slot 70 in the wall of the valve 62 enables a variable flow of liquid soap or shampoo from the passageway 68 into the interior of the valve 62, and then along the passageway 63 into the throat 56 of the venturi tube 55.

In operation of the mixer, hot and cold water flow into the chamber 51, down the venturi tube 55, and out of the mixer either into the bath via outlet aperture 72 or to a shower head via outlet 60. As it flows through the venturi throat 56, the water creates a region of reduced pressure, which is used to suck liquid soap or shampoo from one of the collapsible bags 52 into the flowing water stream. The liquid soap or shampoo in the collapsible bags is at the same pressure as the water in the chamber 51, and when valve 62 is turned to an "on" position, the liquid soap or shampoo flows down the pipe 65, through passageways 66, 67 and 68,

through the slot 70, into the interior of valve 62, and along passageway 63 into the water stream in the venturi throat 56. Thus the water outflow either to the bath or the shower may be made to contain the desired concentration of either liquid soap or shampoo. There are, of course, two passageways 68 in the mixer, one in each body half, so the slot 70 may be aligned with either one of these passageways, to select the liquid in either one of the collapsible bags.

In order to allow the mixer to drain when it is not in use, a very narrow bleed channel 73 is provided between the bottom of chamber 51 and the venturi throat 56. During operation of the mixer, a negligible flow of water occurs along bleed channel 73, but when the mixer is inoperative, and the gate valve 58 is turned to the 'bath' position, all water remaining in the mixer can drain out, via channels 59, 55 and 73.

The mixer shown in Figure 3 may be used with a single shower head, or may be provided with an upper casing, like that described in the Figures 1 and 2 embodiment, and may be provided with two shower heads. A selector valve may be used to divert the water to either one, or to both, of the two heads.

The twin shower head arrangement may, of course, be used with a mixer that simply mixes hot and cold water, without any means for introducing liquid soap or shampoo into the water outflow.

Referring now to Figure 4, there is shown an alternative form of mixer operating on the same principle as that shown in Figure 3. The mixer of Figure 4 includes a single collapsible bag, intended for introducing soap into water delivered to a bath or to either or both of two shower heads. The reservoir for the liquid soap includes, in addition to the plastic bag, a rigid-walled container for storing a larger volume of liquid soap. As with the mixer of Figure 3, the view shown in Figure 4 includes one half of a mixer body for securing to a corresponding, oppositely-handed body half. Similarly with Figure 3, the body 100 of the mixer of Figure 4 may be of any suitable cross-section, such as rectangular or cylindrical. Again, most of the channels formed in each body half are semi-cylindrical.

Water from each of the hot and cold supply pipes (not shown) enters the mixer through a pipe-like cavity 101. Control valves (not shown) for the inflowing water may be provided at the level of the cavity 101. Non-return valves (not shown) may also be provided between the control valves and the centre of the mixer. In the centre of the mixer body, the hot and cold water streams mix, and then flow into the upper part of the chamber 102. Baffles (not shown) may be provided to direct the inflowing water streams into the chamber 102, so that the incoming streams do not impinge directly upon one another. Mixed hot and cold water then flows down through the chamber 102, and through a narrow portion forming a venturi tube 103. After the narrow portion, the tube opens out again to form a discharge portion 104, and water flows out of the discharge portion 104 through an exit opening 105 into a hollow

tubular diverter 106. From the diverter 106, the water always finds an exit, either through a bath outlet 107, or into one or both of two shower outlets 108, 109.

The diverter 106 has a series of openings 110 around its circumference adjacent the exit opening 105, so that whatever the rotational position of the diverter, water always flows into it. A bath outlet aperture 111 in the diverter aligns with the bath outlet 107 when the diverter is rotated to the position to select 'bath', and offset shower outlet apertures 112 and 113 are suitably positioned around the diverter to enable the selection, instead of the bath, of either or both of the shower outlets 108, 109. The apertures 111, 112, 113 are arranged so that water within the diverter always has an exit, i.e. the operative positions of the apertures overlap each other. Furthermore, minor apertures, not shown, are provided adjacent the shower outlet apertures so that when the bath outlet is selected, seepage of water from the shower heads is permitted, allowing for full drainage of the system when it is not in use. Channels 114 and 115 connect shower outlets 108 and 109 with lower and upper shower heads respectively.

Within the chamber 102 is mounted a collapsible bag 120 for containing liquid soap (or shampoo). The bag 120 is carried by a frame 121 which consists of a cylindrical collar 122 at its upper end, and a downwardly-extending U-shaped frame 123 to enable the bag to flatten when it is emptied, but not to collapse upwards into the collar 122. The collar 122 has an upper flange 124 with which the collar 122 is secured to the body 100 of the mixer. Liquid soap is stored in a storage cavity 125 which is formed in the body 100 above the chamber 102. The soap can flow down from the storage cavity 125 into the bag 120 through a channel 126 which contains a ball valve 127. Ball valve 127 allows downward flow of the liquid soap, but prevents upward flow. Whenever the mixer is not in use, liquid soap from the storage cavity 125 fills the bag 120.

During operation of the mixer, water in the chamber 102, which is at substantially the inlet pressure, pressurises the liquid soap in the bag to the same pressure as the water in the chamber. Water flowing through the venturi tube 103 is at a reduced pressure compared with that in the chamber 102. A soap supply channel 130 is formed between the channel 126 and the venturi tube 103, with an intervening gate valve 131. On opening the gate valve 131, liquid soap is sucked out of the bag 120, and flows into the water flowing through the venturi tube 103. Thus the water leaving the mixer contains liquid soap, the concentration of which can be varied as required by suitably positioning the gate valve 131. Liquid soap in the storage cavity 125 is replenished via screw-on filler cap 132.

Although the collapsible bag 120 has been shown in Figure 4 as being on the inlet side of the venturi tube, it is also possible to position it on the outflow side of the venturi, and a mixer including this arrangement is shown in Figure 5. In Figure 5, parts which correspond with those of Figure 4 have been given the same reference numbers, and will not be described

further. In the mixer of Figure 5, the collapsible bag 120 is situated in a lower chamber 140 just above the exit opening 105. In this case, soap supply channels 126 and 130 meet at gate valve 131, which is modified to allow soap to flow down into bag 120 at any time, but to allow soap to flow upwards from the bag and into the venturi tube 103 only when the gate valve 131 has been turned to the appropriate position. The gate valve 131 is accordingly modified by having two bores 140 and 141, and the soap supply channel 130 is branched adjacent the gate 131 for cooperation with the two bores. The bore 140 is of such size and configuration that it allows liquid soap to flow through the gate valve during the entire range of movement of the bore 141 between its fully open and its fully closed positions.

In a modified version (not shown) of the mixer of Figure 5, an additional pipe-like channel may be formed between the inlet cavity 101 and the discharge portion 104, so that some of the water by-passes the venturi tube 103. Such an arrangement is useful in certain configurations to ensure that a suitable pressure differential is quickly and reliably established between the liquid soap in the bag 120 and the water flowing through the venturi tube.

Although the mixers of Figures 3, 4 and 5 have been described in the context of body halves cast or moulded from solid material, it is to be understood that equivalent mixers may be constructed using standard pipework connecting various chambers contained within a housing.

What I claim is:

1. A bath/shower mixer comprising a chamber into which water flows in use of the mixer, a reservoir for a liquid additive, means for transmitting the pressure of the water in the chamber to the additive in the reservoir, means for producing in the flowing water a region of reduced pressure compared with the pressure of the water in the chamber, and means for selectively connecting the reservoir to the region of reduced pressure whereby the additive may be introduced into the flowing water, and diverter means for diverting the flowing water either to a bath outlet or to a shower outlet of the mixer.
2. The mixer of claim 1 wherein the means for selectively connecting the reservoir to the region of reduced pressure comprises means for varying the flow rate, so as to vary the concentration of additive in the water.
3. The mixer of claim 1 or claim 2 wherein said reservoir comprises a collapsible bag within said chamber.
4. The mixer of any one of claims 1 to 3 wherein there are two or more of said reservoirs.
5. The mixer of any one of claims 1 to 4 wherein said means for producing a region of reduced pressure in the flowing water comprises a venturi tube
6. The mixer of claim 5 wherein said chamber is between the inlet of the mixer and the venturi tube.
7. The mixer of claim 5 wherein said chamber is between the venturi tube and the outlet of the mixer.
8. Shower apparatus comprising a body portion adapted to be secured to a bath, first and second shower heads mounted on said body portion, and selector means for diverting water to the shower heads.
9. The shower apparatus of claim 8 wherein the selector means is arranged for selecting either one of said shower heads, or both of said shower heads together.

10. The shower apparatus of claim 8 or claim 9 wherein the selector means is also arranged for selecting an outlet to the bath.

11. The shower apparatus of any one of claims 8 to 10 wherein at least one of the shower heads is mounted on said body portion by means of a flexible pipe.

12. Bath/shower apparatus comprising a combination of the shower apparatus of any one of claims 8 to 11 and a mixer according to any one of claims 1 to 7.

13. A bath/shower mixer according to claim 1 substantially as hereinbefore described with reference to the accompanying drawings.

14. A shower apparatus according to claim 8 substantially as hereinbefore described with reference to the accompanying drawings.

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